KENWOOD

Color Pattern Generator

CG-931
CG-932

INSTRUCTION MANUAL

KENWOOD CORPORATION

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A product of
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This manual was written for use with both the CG-931 and CG-932 models. The main flow of the manual is written in terms of the CG-931, with portions pertaining to the CG-932 shown in brackets [ ] .

1. OUTLINE

The CG-931 [CG-932] is a portable color pattern generator for use in the generation of color bar, dot, cross-hatch, and centercross patterns. It is used in the testing, adjustment, and repair of NTSC [PAL] format color and black-and-white television receivers, and the imaging components of video recorders (VTR). In addition, remote-controllable models are available which enable all patterns to be switched remotely via the optional remote controller RT-62.

2. FEATURES

☐The product is a NTSC [PAL] standard format color pattern generator which enables switching between full-field and I.Q.W. [PAL: U.V.W.] insertion, and offers chrominance and luminance ON/OFF options.

☐The device can switch between two types of split color bars.

☐S output is provided as standard equipment, and Y+S and C outputs can also be obtained from the BNC terminal on the rear panel.

☐The Y+S and C values of the S output can be varied individually.

☐The setup, chrominance, and luminance levels can be freely set, and a CAL is provided to make the device convenient for use in operations such as the adjustment and repair of color television receivers and the like.

☐Through use of red, blue, green, and white rasters, the device enables purity confirmation, and investigation and adjustment of white balance.

☐The device enables raster alignment and investigation and adjustment of convergences by use of center cross and dot patterns.

☐The device enables evaluation of high-voltage stability via window patterns.

☐The device is provided with a 75 ohm video output for video components and all types of TV monitors, and a 75 ohm RF output for television receivers.

☐To facilitate observation of the various TV receiver wave forms via oscilloscope, vertical and horizontal synchronizing signals can be obtained.

☐The device's synchronizing signal includes an equalizing pulse, and the device is phase-locked on the sub-carrier wave frequency.

☐In addition to interlaced scanning, the device allows switchover to sequential scanning mode, thereby enabling a reduction in striping flicker and simplifying related investigation and adjustment procedures.

☐Remote controllable models are also available which enable remote switching of all pattern options using the RT-62 remote controller.

3. SPECIFICATIONS

① Patterns

Cross-hatch	16×20, white on black with one dot at center-screen, and displays the corner-marker on the upper-left portion of the screen
Center-cross	1×1, white on black, crossed at center-screen, and displays the corner-marker on the upper-left portion of the screen
Dot	15×19, white on black
Window	0.5×0.5, white on black
Raster	red, blue, green, white
Color	(See diagram on page 16)
CG-931 ·····	EIA: RS-189A standard SMPTE: ECR-1-1978 standard
CG-932 ·····	BARS 1: 2 minute increments BARS 2: 3 minute increments
I.Q.W. OFF [PAL: U.V.W.]	Full-field color bars
CHROMA OFF	Luminance-only pattern obtained by removing chrominance component from color bar signal
LUMI OFF	Chrominance-only pattern obtained by removing luminance component from color bar signal

② Video Output

Output level	CAL: 1.0 V p-p (under 75 ohm load) VAR: 0−1.5 V p-p (under 75 ohm load)
Output impedance	75Ω
Polarity	Positive (synchronizing signal negative)

③ S Output

Output level: (under 75 ohm load)

	Y+S	C
CAL	1 V p-p (SYNC-100% white)	286 [300] mV p-p(burst)
VAR	+/− 20%	+/− 20%

④ RF Output

Modulation method: Negative modulation

Image frequency:

CG-931:

CH	Japan CH (MHz)	USA CH (MHz)
A	CH2 97.25	CH5 77.25
B	CH3 103.25	CH6 83.25

CG-932

CH	Western Europe CH (MHz)	Italy CH (MHz)	Australia CH (MHz)
A	CH3 55.25	CHA 53.75	CH1 57.25
B	CH4 62.25	CHB 62.25	CH2 64.25

New Zealand CH (MHz)	England CH (MHz)
CH2 55.25	CH71 495.25
CH3 62.25	CH77 543.25

Output level above 60 dBμ

Output impedance 75 ohm

⑤ Synchronizing Signal Output

Frequency: Horizontal and vertical frequencies

Output voltage: About 1 V p-p (output terminal open)

Output impedance: 75 ohm

⑥ Sub-carrier Wave Frequency

CG-931: 3.579545 MHz

CG-932: 4.433619MHz

⑦ Sub-carrier Wave Output

Frequency: Center frequency +/− 100 Hz, adjustable to within +/− 5 Hz

Output voltage: About 1 V p-p (output terminal open)

Output impedance: 75 ohm

⑧ Color burst

Minimum 8 cycles at back porch of horizontal synchronizing signal

⑨ Synchronizing Signal

		CG-931 (NTSC)	CG-932 (PAL)
Horizontal Scan Frequency		15.734 kHz	15.625 kHz
Vertical Scan Frequency	Interlace	59.94 Hz	50.00 Hz
	Sequential	60.05 Hz	50.08 Hz

⑩ Video Signal Output Level

CG-931 (NTSC)

	75% white	yellow	cyan	green	magenta	red	blue
Brightness component +/− 5% (IRE)	77	69	56	48	36	28	15
Chroma level +/− 5% (IRE)	---	62	88	82	82	88	62
Chroma phase +/− 5 (deg)	---	167	283	241	261	103	347

	Q	− I	burst	black	sync signal level
Brightness component +/− 5% (IRE)	7.5	7.5	0	7.5	40
Chroma level +/− 5% (IRE)	40	40	40	---	---
Chroma phase +/− 5 (deg)	33	303	180	---	---

CG-932 [PAL]

		100% white	75% white	yellow	cyan	green	magenta	red
Brightness component +/− 5% (mV p-p)		700	525	465	368	308	217	157
Chroma level +/− 5% (mV p-p)		---	---	470	664	620	620	664
Chroma phase +/− 5 (deg)	+V	---	---	167	283	241	61	103
	−V	---	---	193	77	119	299	257

		blue	U	V	burst	black	sync signal level
Brightness component +/− 5% (mV p-p)		60	0	0	0	0	300
Chroma level +/− 5% (mV p-p)		470	300	300	300	---	---
Chroma phase +/− 5 (deg)	+V	347	0	90	135	---	---
	−V	13	0	270	315	---	---

Tolerance: ±5% or 3 IRE (21mV), which ever is greater, with the 100% white signal as reference.

⑪ Level Control

CHROMA Level

The raster or color bar chrominance level can be varied over a range of +/− 20%.
However, the maximum value for the amplitude of the yellow and cyan color bar signals can be preset to give the same level as the 100% white signal.

LUMINANCE Level

The luminance level of all patterns can be varied over a range of 20%. However, the white signal in the raster mode can be preset to 100%.

SETUP Level

The setup level of all patterns can be varied over a range of 0−10%. However, the black level can be preset to 7.5%.

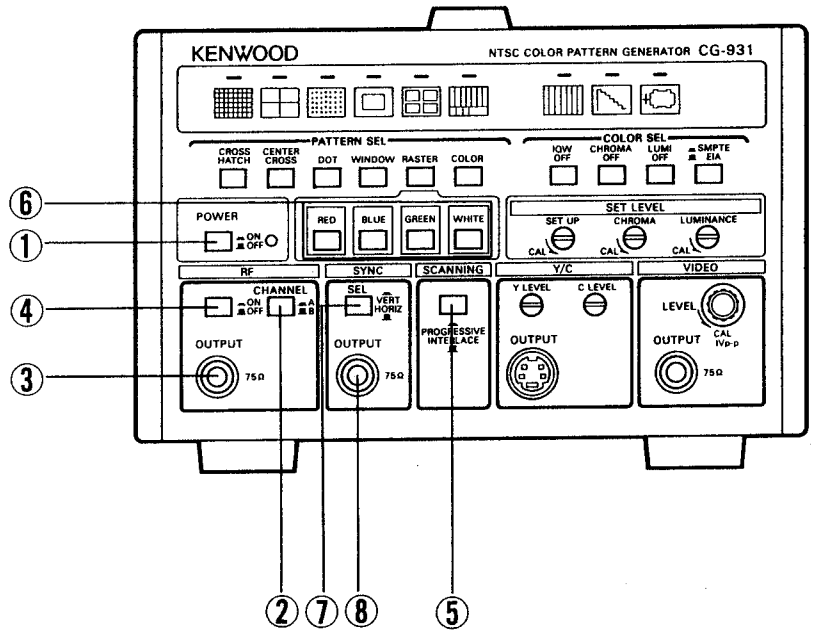
⑫ Remote Operation (Remote Control Option)

Pattern switching: 4 bit BCD (negative logic)
Switching between panel and remote: 1 bit (negative logic)
Remote control: 1 bit (negative logic)

⑬ **Power Supply**		
Supply Voltage	AC 100/120/220/240 V, +/− 10% (max. 250 V), 50/60 Hz
Power Consumption	About 17 W
⑭ **Temperature within specification**	10 ~ 35C°, RH 85% max.
full operation	0 ~ 40C°, RH 85% max.
⑮ **Dimensions**	212(W)×133(H)×272(D) mm
Max.	212(W)×156(H)×298(D) mm
⑯ **Weight**	3.5 kg
⑰ **Accesories**	
Power cord	1
Connecting chord (CA-41) (BNC-Worm clip)	1
Instruction Manual	1
Fuses	2

4. PANEL EXPLANATION

FRONT PANEL



① **POWER**
The power ON/OFF push-switch. When depressed, the LED lights up and the machine is in the operating state.

② **RF CHANNEL Switch**
The channel changing switch used when the television receiver is receiving patterns from the pattern generator. The switch selects Channel A when depressed and Channel B when returned to the up position, and it can receive all of the designated patterns.

③ **OUTPUT (RF Signal Output) Terminal**
The terminal that outputs the RF signal selected by the RF CHANNEL switch (#2 above). It has an output impedance of 75 ohm and an output voltage of over 10 V rms (when output terminal is open).

④ **RF ON/OFF Switch**
Switch for turning the RF signal ON and OFF. It is used when the RF signal is not being utilized. When the switch is depressed, the RF signal is ON.

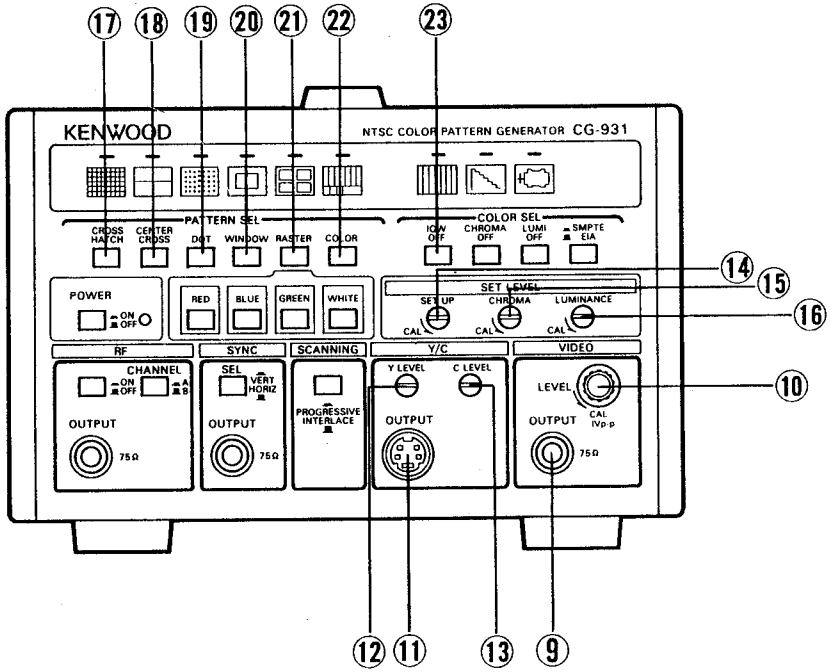
⑤ **SCANNING Switch**
Switches between INTERLACE scan and SEQUENTIAL scan. The switch selects the sequential (progressive) scanning mode when depressed, and the interlace scanning mode when returned to the up position.
When performing adjustment and testing procedures, use the INTERLACE mode for color patterns and, for monochrome patterns, use the SEQUENTIAL mode to reduce the occurrence of horizontal flicker.

⑥ **Raster Select Switch**
Switch for selecting the raster color. Moving from left to right, this switch enables selection of red, blue, green, or white (brightness 100%). The raster white is represented by white with a brightness level of 100%. When a black raster is required, turn the pattern selector to "COLOR" and turn the color selectors to "CHROMA OFF" and "LUMI OFF."

⑦ **SYNC Switch**
Switch for changing the synchronizing signal. When the switch is depressed, a vertical sync signal is output via the OUTPUT terminal (#8), and when the switch is returned to the up position, a horizontal sync signal is output via the terminal. When adjusting or repairing color TV receivers using an oscilloscope, use this switch when you want to force synchronization along one specific axis (horizontal or vertical).

⑧ **OUTPUT (Sync. Signal Output) Terminal**
Output terminal for the sync signal selected by the SYNC Switch (#7). The terminal has an output impedance of 75 ohm and an output voltage of about 1 V p-p (when output terminal is OPEN).

FRONT PANEL



⑨ VIDEO OUTPUT

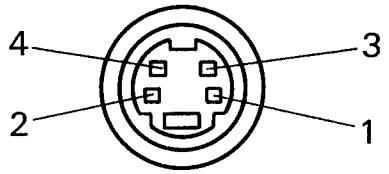
The video output terminal. The terminal has an output impedance of 75 ohm. It outputs composite video signals consisting of synchronizing, blanking, burst, and the various pattern signal components. Polarity is positive (the synchronizing signal is negative).

⑩ VIDEO LEVEL

Turn-knob for varying the video output level. This knob allows the video output level to be varied from 0−1.5 V p-p and, when turned all the way to the left (CAL), a signal of 1 V p-p can be obtained via the output terminal.

⑪ S Terminal

The Y, C separation output terminal.



1: Y GND
2: C GND
3: Y SIGNAL
4: C SIGNAL

⑫ Y LEVEL

The Y component of the S output can be varied over a range of +/− 20% by manipulation of the corresponding turn-knob. It is calibrated while turned all the way counterclockwise.

⑬ C LEVEL

The C component of the S output can be varied over a range of +/− 20% by manipulation of the corresponding turn-knob. It is calibrated while turned all the way counterclockwise.

⑭ SET LEVEL (SET UP)

When this semi-fixed turn-knob is turned clockwise, the setup level of the video signal can be varied over a range of 0-10%. If this knob is turned all the way in the counterclockwise direction (CAL), the black level is calibrated to 7.5%. [calibrated to 0% for the CG-932]

⑮ **SET LEVEL (CHROMA)**

When this semi-fixed turn-knob is turned clockwise, the chrominance level of the color signal can be varied over a range of about +/− 20%. During ordinary use, this knob should be turned all the way in the counterclockwise direction (CAL).

⑯ **SET LEVEL (LUMINANCE)**

When this semi-fixed turn-knob is turned clockwise, the luminance level of the color signal can be varied over a range of about +/− 20%. During ordinary use, this knob should be turned all the way in the counterclockwise direction (CAL).

NOTE:

Manipulation of semi-fixed turn-knobs 14 through 16 results in changes in the RF modulation factor. To achieve the optimal modulation factor, make your adjustments so that the VIDEO OUTPUT terminal (#9) gives an output of 1 V p-p (the VIDEO LEVEL (#10) should be set to CAL).

⑰ **CROSS HATCH**

When this button is pushed, the screen displays a 16×20 line white-on-black cross-hatched rectangle with one dot at the center.

⑱ **CENTER CROSS**

When this button is pushed, the screen display a 1 ×1 line white-on-black center cross.

⑲ **DOT**

When this button is pushed, the screen displays a 15×19, white-on-black dot pattern.

⑳ **WINDOW**

When this button is pushed, the screen displays a 0. 5×0.5 white-on-black window pattern.

㉑ **RASTER**

When this button is pushed, the screen becomes a raster grid, whose color can be selected (red, blue, green, or white) via the selector switch (#6).

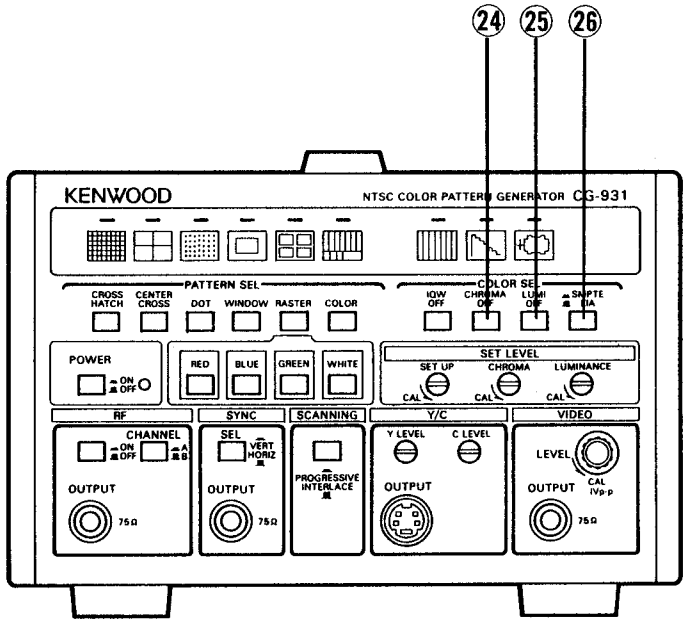
㉒ **COLOR**

When this button is pushed, the upper part of the screen displays the color bar, and the lower part generates Q, −I [U, V] , white, and black signals. This is the standard color bar used in the testing and adjustment of image devices including color TV receivers, black-and-white TV receivers, and VTRs.

㉓ **I.Q.W. [U.V.W.] OFF**

When this button is pushed, the green lamp on the upper portion lights up and, in place of the Q, −I, [U, V], 100% white, and black color pattern signals set up in the COLOR (#22) mode, a color bar is inserted into the lower half of the screen to give a full-field color bar. If this button is pushed again, the screen displays a split color bar with −I, Q, [U, V] , white, and black nserted, and the green lamp cuts off.

FRONT PANEL



㉔ CHROMA OFF

When this button is pushed, the green lamp on the upper portion lights up and the chrominance component is removed. If the button is pushed again, the screen returns to the previous state and the green lamp cuts off.

㉕ LUMI. OFF

When this button is pushed, the green lamp on the upper portion lights up and the luminance component of the color pattern is removed. If the button is pushed again, the screen returns to the previous state and the green lamp cuts off.

㉖ BARS SELECTOR

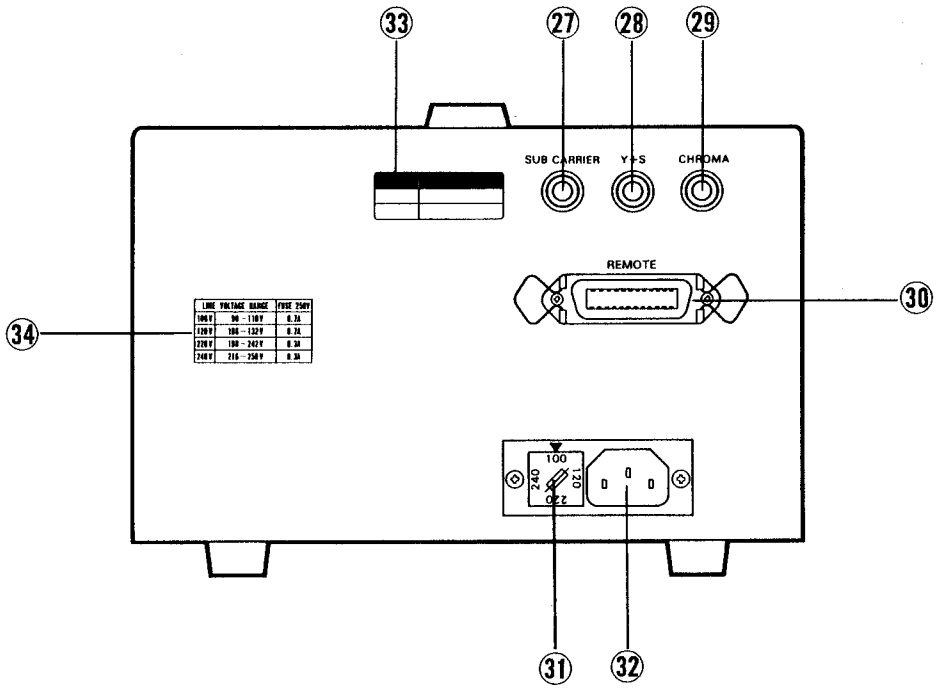
For the CG-931: Switches between a EIA RS-189A standard color bar and a SMPTE specification color bar.

For the CG-932: Selects one of two different split color bars.

NOTE:

Switches ㉓–㉖ operate independently, and they have no bearing on any color pattern other than the color bar.

REAR PANEL



㉗ SUB CARRIER

The square waves of the color sub-carrier are output, with an output impedance of 75 ohm and an output level of about 1 V p-p when the output terminal is OPEN.

㉘ Y+S

The luminance output of the S terminal on the front panel is output via the BNC terminal.

㉙ CHROMA

The chrominance output of the S terminal on the front panel is output via the BNC terminal.

㉚ REMOTE

An Amphenol 24-pin connector utilized when the device is controlled remotely using the RT-62. This connector is installed only in models which are equipped for use with the RT-62. Other models have only a blank plate.

㉛ Fuse Holder/Supply Voltage Switch

The fuse holder contains a 0.7 A fuse for use in 100 V and 120 V regions, and a 0.3 A fuse for use in 220 V and 240 V regions. For directions regarding fuse replacement, please see Section 7, "Maintenance." The preset supply voltage of the device is indicated on the upper portion of the supply voltage switch, below the mark. For directions regarding resetting of the supply voltage, please see Section 7, "Maintenance."

㉜ Power Supply Input Connector

Connector for input of the AC power supply.

㉝ Channel Specification Plate

The RF channels A and B are set as indicated on the Channel Specification plate.

㉞ Voltage Specification Table

Indicates the rated voltage and fuse specifications for the device. Please comply with the designated supply voltage and fuse specification values.

5. PRECAUTIONS USE

◇Do not use the device in any place subjected to direct sunlight, as this may cause the internal temperature to rise, resulting in unstable operation. In some cases, this may also result in damage to transistors or ICs in the device.

◇Avoid using the device in locations subjected to high temperatures or humidity.

◇Do not use the device in locations that are particularly subject to vibrations, as this may cause misoperation.

◇Use the device with an AC power supply that supplies a voltage lying within +/− 10% of the device's rated voltage. The supply frequency should be 50/60 Hz.

◇Do not apply voltages externally to any of the output terminals (RF OUTPUT, SYNC OUTPUT, VIDEO OUTPUT, SUB CARRIER, etc.).

◇When connecting the device into a TV receiver, to avoid electrical shock, be sure to remove the receiver's electrical cord from the AC socket.

◇When operating the push-buttons, push gently on the center of the buttons.

◇When using the device in connection to a TV receiver, be sure to match the device's RF channel correctly to that of the TV receiver.

6. DIRECTIONS FOR USE

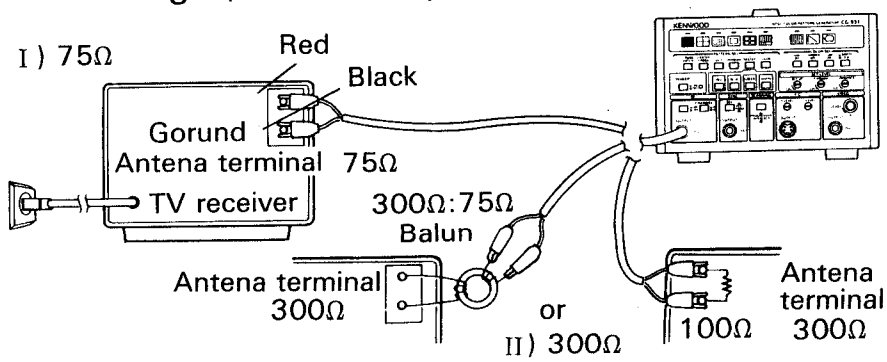
ACHIEVING OPERATION

Plug the powercord into an AC socket AFTER you have made sure that the voltage of your power supply matches the voltage to which the SUPPLY VOLTAGE switch on the rear panel is set. Push the POWER switch (1). The POWER LED will light up and the device will enter the operating state. At this point, the pattern selected via the push-button will display.

CONNECTING TO A TV RECEIVER

When using the device for the adjustment, investigation, or repair of TV receivers, please be careful of the following points.

1) Disconnect the feeder or coaxial cable from the ANTENNA terminal of the receiver.
2) Check the characteristics and impedance of the ANTENNA terminal.
3) Check whether or not any high voltages or AC voltages are leaking to the ANTENNA terminal. If there is a leakage voltage, connect the device via a condenser having a proof voltage corresponding to this leakage (10−1000 pF).



PATTERN USAGE

1) Cross-Hatch

The center dot is used to adjust the static convergence of the picture tube. The cross-hatch pattern is used for adjustment of the dynamic convergence, and for the adjustment, investigation, and remediation of raster alignment parameters such as vertical and horizontal amplitude, and vertical and horizontal linearity.

2) Center-cross

Used for the picture tube's horizontal and vertical position adjustment.

3) Dot

Used for adjustment of the picture tube's static convergence and focus.

4) Raster

The red, blue, and green raster patterns are used to adjust and confirm color picture tube purity.

5) Window

Used for the adjustment of video circuits, and for the evaluation of high-voltage stability.

6) Color Bar

a. Split Color Bar (Set Color Selector to "ON" Position)
   Used for adjustment of CHROMA circuits and ACC (automatic color control) in TV receivers, and for setting of CHROMA levels, ACC, CHROMA level balance, and burst gate (amplitude, phase) in VTRs.

b. Full-Field Color Bar (Set I.Q.W. [U.V.W.] to" OFF")
   Used when the Q, −I [U, V] and white signals are not required for operations such as adjustment of "a" above.

c. Gray Scale
   Gray scale patterns can be obtained by removing the chrominance component from the color bar (by pressing the Color Selector "CHROMA OFF" button) to display only the luminance component. These patterns can be used for the adjustment, investigation, and repair of linearity, white balance, and other parameters crucial in image amplification in devices such as TV receivers and VTRs.

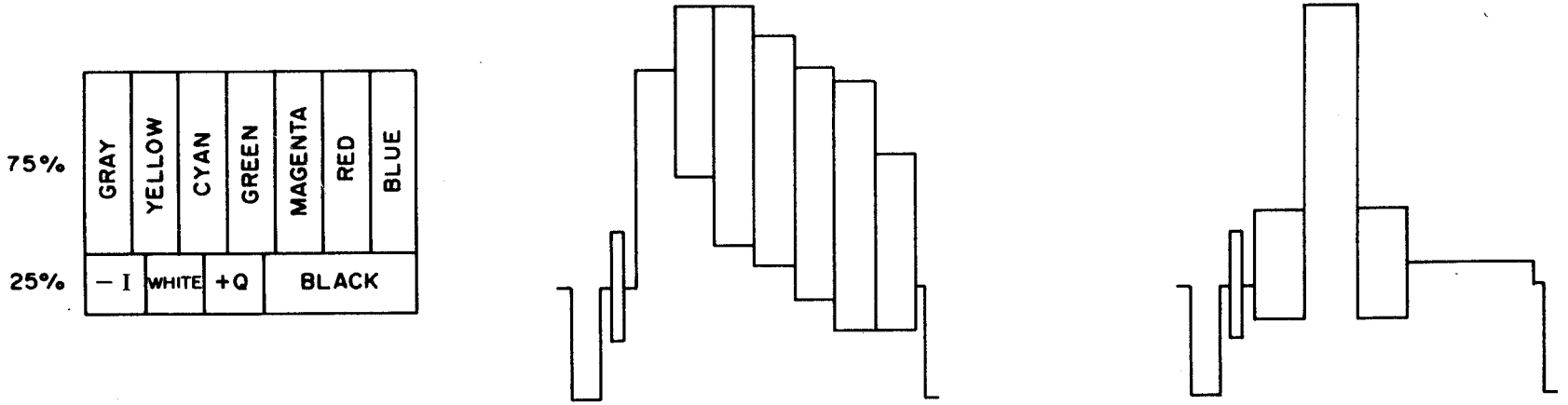
d. CHROMA Signal
   The chrominance-only pattern can be obtained by removing the luminance signal from the Color Bar (by pressing the Color Selector "LUMI OFF" button). This pattern can be used to investigate CHROMA signal levels and phase changes as related to image amplification.

e. Black burst
   Removal of the luminance and chrominance component from the full-field color bar signal results in a "black burst" signal containing COMPOSITE SYNC and SETUP components.

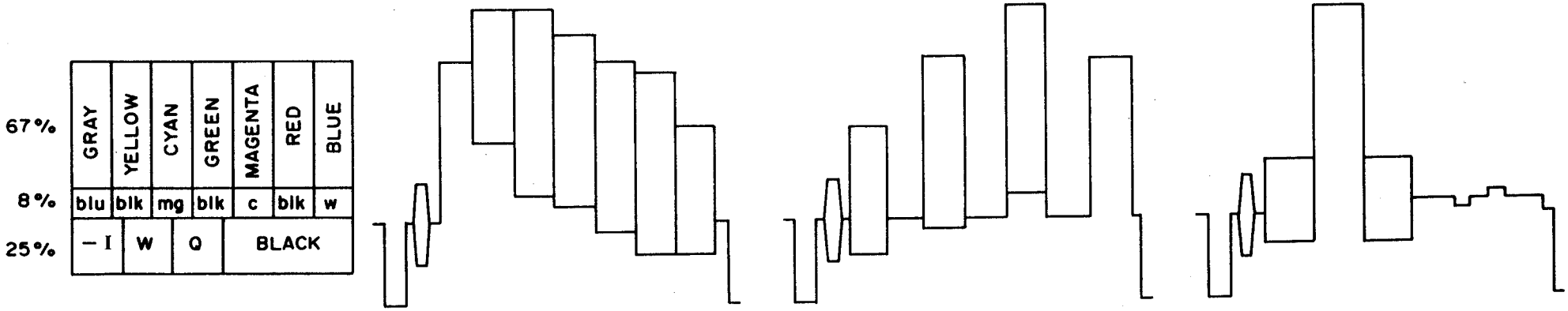
f. Composite sync
   If the luminance and chrominance signals are removed from the split color bar, the result is a signal containing only the COMPOSITE SYNC and SETUP components.

COLOR BAR SIGNAL

EIA COLOR BAR (BARS 1) SIGNAL



SMPTE COLOR BAR (BARS 2) SIGNAL



REMOTE OPERATION
(Remote Control Option Only)

The pattern generator can be operated remotely using the RT-62 Remote Controller, which is sold separately. All combinations of patterns can be selected by switching among settings 1 through 16. For details, please refer to the RT-62 Instruction Manual.

CONTROL SIGNALS

REMOTE SWITCHING

Panel	H
Remote	L

REMOTE CONTROL

Controllable	L
Non-controllable	H

PATTERN SWITCHING

RT-62 Pin Number	Control Signal				Combinations of Pattern Signals
	A	B	C	D	
1	L	H	H	H	①
2	H	L	H	H	②
3	L	L	H	H	③
4	H	H	L	H	④
5	L	H	L	H	⑤
6	H	L	L	H	⑥
7	L	L	L	H	⑦
8	H	H	H	L	⑧
9	L	H	H	L	⑨
10	H	L	H	L	⑨+⑩
11	L	L	H	L	⑨+⑪
12	H	H	L	L	⑨+⑫
13	L	H	L	L	⑨+⑩+⑪
14	H	L	L	L	⑨+⑪+⑫
15	L	L	L	L	⑨+⑫+⑩
16	H	H	H	H	⑨+⑩+⑪+⑫

① CROSS HATCH
② CENTER CROSS
③ DOT
④ WINDOW
⑤ RASTER-R
⑥ RASTER-G
⑦ RASTER-B
⑧ RASTER-W
⑨ COLOR
⑩ I. Q. W. OFF
⑪ CHROMA OFF
⑫ LUMI OFF

CONNECTOR PIN HOOK-UP

Pin Number	Signal	Pin Number	Signal
1	A	1	Remote Control
2	B	10	Remote Switching
3	C	11	GND
4	D	12	+5 V

NOTE: +5 V is for the RT-62 LED, up to 10 mA.

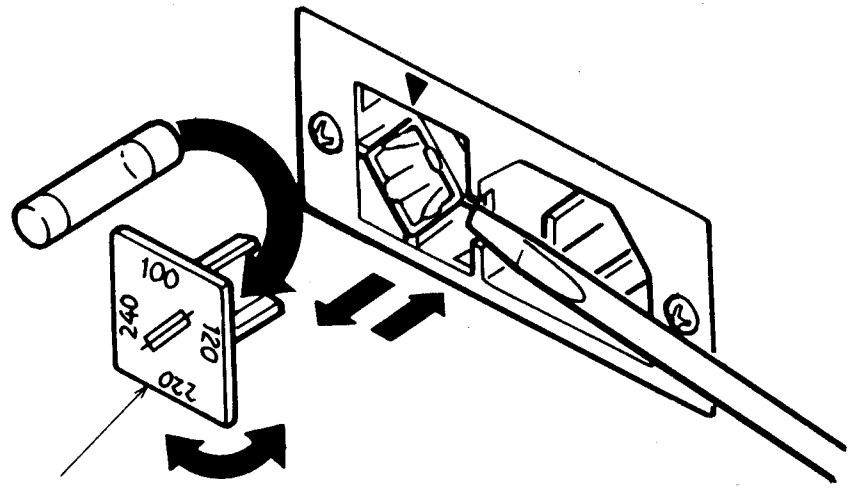
7. MAINTENANCE

⚠ Caution: Read this page carefully to keep your safety.
For Electric Shock Protection:
Be sure to disconnect the power cable from the socket before conducting the following operation.

PEPLACING THE FUSE

In case the fuse has blown, locate the cause. If the fuse itself is the cause, replace it a follows:

1. Pull the plug of the power cord from the power outlet.
2. Remove the fuse holder in the rear panel using a standard screwdriver.
3. Take out the blown fuse, and in its place, insert a new fuse.
4. Set the label of your line voltage to the mark ▼, then plug the fuse holder containing the new fuse into the rear panel.



Fuse holder

CHANGING THE SUPPLY VOLTAGE

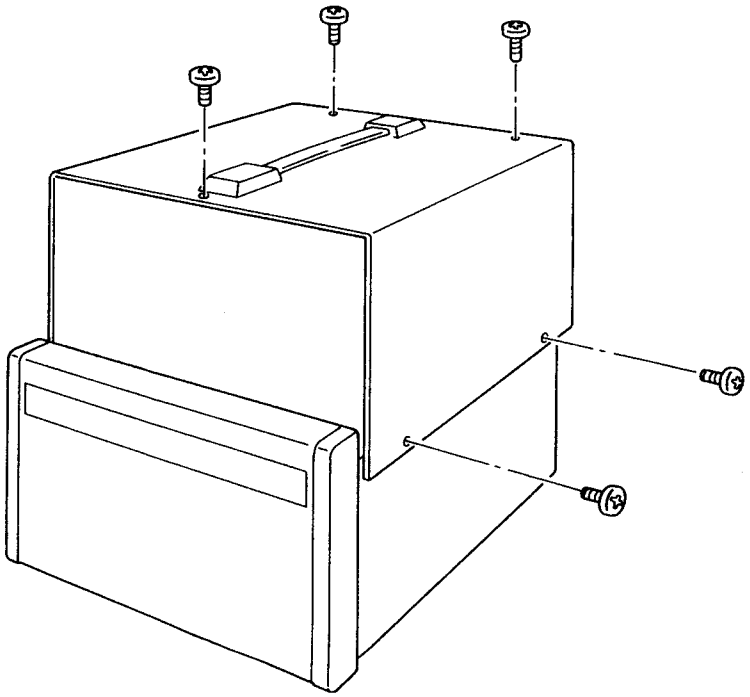
Remove the fuse holder in the rear panel using a standard screwdriver. Then set the label of your line voltage to the mark ▼ and plug the fuse holder back into place. When changing the supply setting from 100/120 V to 220/240 V, change the 0.7 A fuse for a 0.3 A one.

8. ADJUSTMENT

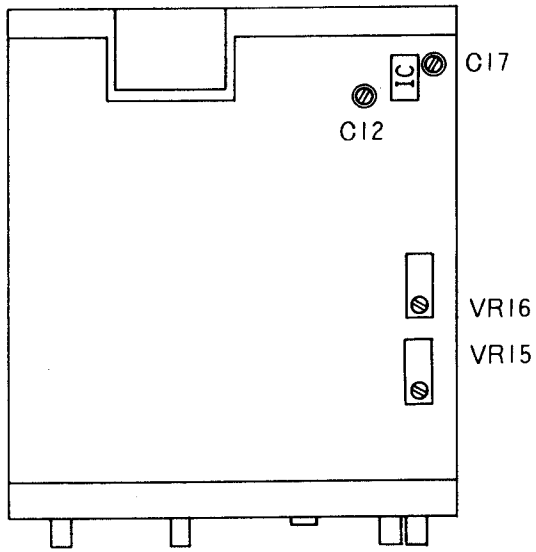
WARNING

THE FOLLOWING ADJUSTMENT INSTRUCTIONS ARE FOR USE BY QUALIFIED PERONNEL ONLY. TO AUOID PERONAL INJORY. DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.

1) Removing the case
   Using a Phillip's screwdriver, remove the 7 screws located on the top and side panels.



2) Adjusting the sub-carrier frequency
   Connect a counter to the sub-carrier output on the rear panel and adjust C17 using the insulated adjustment rod. [For the CG-932, adjust C12. BE SURE NOT TO TOUCH C17.]



Front

C17 ·····Adjusts the subcarrier frequency in the CG-931. Be sure not to touch this trimmer in the CG-932.

C12 ·····Adjusts the sub-carrier frequency in the CG-932. This trimmer is not provided in the CG-931.

VR15 ···Adjusts the RF frequency for CH A.

VR16 ···Adjusts the RF frequency for CH B.

3) Adjusting the RF frequency

○Set the PATTERN switch to "COLOR" and switch the LUMI OFF and CHROMA OFF switches to "ON".

○Set the RF switch on the front panel to "ON" and connect a counter to the output terminal. Adjust VR15 for CH A and VR16 for CH B. It the RF level is lower than the counter trigger level, introduce a high-frequency amp into the connection with the counter.

○Be sure to use a terminal resistance of 75 ohms.

9. OPTIONS

RT-62 Remote Controller

A hand-held controller that allows remote operation of the instrumentation. The controller contains two control systems which use 4-bit binary signals, and it allows switching to be accomplished among 16 ranges and modes in as many as eight steps each. In addition, one of the control systems can be programmed to accommodate a 16-step mode, which can be selected by a push- switch.